Complete College Idaho Remediation Institute
April 26, 2013

Katie Hern
Director,
California Acceleration Project

What's the Problem?

- The more levels of developmental courses a student must go through, the less likely that student is to ever complete college English or Math.

Bailey, Thomas. (February 2009). Rethinking Developmental Education. *CCRC Brief*. Community College Research Center. Teachers College, Columbia University.

Nationwide Data

256,672 first-time degree-seeking students from 57 colleges participating in Achieving the Dream

Students' initial enrollment in developmental sequence	% of students who successfully complete college-level gatekeeper course in subject
Reading	
1 Level Below College	42%
2 Levels Below College	29%
3 Levels or More Below College	24%

Referral, Enrollment, and Completion in Developmental Education Sequences in Community Colleges (CCRC Working Paper No. 15). By: Thomas Bailey, Dong Wook Jeong & Sung-Woo Cho. December 2008. New York: Community College Research Center, Teachers College, Columbia University. (Revised November 2009).

Nationwide Data

256,672 first-time degree-seeking students from 57 colleges participating in Achieving the Dream

Students' initial enrollment in developmental sequence	**% of students who successfully complete college-level gatekeeper course in subject**
Math	
1 Level Below College	27%
2 Levels Below College	20%
3 Levels or More Below College	10%

Referral, Enrollment, and Completion in Developmental Education Sequences in Community Colleges (CCRC Working Paper No. 15). By: Thomas Bailey, Dong Wook Jeong & Sung-Woo Cho. December 2008. New York: Community College Research Center, Teachers College, Columbia University. (Revised November 2009).

California-Wide Data

143,587 students from all CA community colleges

Students' initial enrollment in developmental sequence	% of students who successfully complete transfer-level course in subject
Math	
1 Level Below College	35%
2 Levels Below College	15%
3 Levels or More Below College	6%

Source: Basic Skills Cohort Tracker, Data Mart CCCCO http://datamart.cccco.edu/Outcomes/BasicSkills_Cohort_Tracker.aspx. Fall 2009-Spring 2012. Data includes repeaters.

DISPROPORTIONATE IMPACT ACROSS CALIFORNIA

- Black and Latino students are much more likely to be placed 3-4 levels below college math:

Black students:	61%
Latino students:	53%
White students:	34%
Asian students:	32%

- Non-white students are much more likely to be placed 3-4 levels below college English:

Black students:	25%
Asian students:	19%
Hispanic students:	18%
White students:	8%

Perry, M.; Bahr, P.R.; Rosin, M.; & Woodward, K.M. (2010). Course-taking patterns, policies, and practices in developmental education in the California Community Colleges. Mountain View, CA: EdSource.

Why high attrition rates are a structural problem

For students placing two levels below a college course in English/Math, there are 5 “exit points” where they fall away:

- Do they pass the first course?
- If they pass, do they enroll in the next course?
- If they enroll, do they pass the second course?
- If they pass, do they enroll in the college-level course?
- If they enroll, do they pass the college-level course?

Students placing three levels down have 7 exit points.

WHY HIGH ATTRITION RATES ARE A STRUCTURAL PROBLEM

Chabot College pipeline data for students beginning two levels down from college composition and tracked for three years:

- Do they pass the first course? 66%
- If they pass, do they enroll in the next course? 93%
- If they enroll, do they pass the second course? 75%
- If they pass, do they enroll in the college-level course? 91%
- If they enroll, do they pass the college-level course? 78%

(0.66)(0.93)(0.75)(0.91)(0.78)= 33%

Fall 2006 Cohort. Students tracked from their first developmental English enrollment and followed for all subsequent English enrollments for 3 years. Pass rates includes students passing on first or repeated attempts within timeframe. Basic Skills Cohort Tracker, DataMart.

How would increasing first-course success impact overall completion rate?

$$(0.66)(0.93)(0.75)(0.91)(0.78) = 33\%$$

Try it out…

What if we got the first course to 75% success?

80% success?

90% success?

(Keep the other numbers the same)

The inevitability of attrition in sequences

Table 1: Illustration of the multiplication principle

How many students will pass the college-level course?			
If this was the student's initial placement…	And these were the rates at which they passed each class and persisted to the next class in the sequence…		
	70%	80%	90%
1 level below transfer	34%	51%	73%
2 levels below	17%	33%	59%
3 levels below	8%	21%	48%

Hern, K. & Snell, M. (June/July 2010). Exponential Attrition and the Promise of Acceleration in Developmental English and Math. *Perspectives.* Berkeley, CA: RP Group.

Bottom Line

We will never significantly increase completion rates of college English and Math unless we reduce the length of our developmental sequences and eliminate the many exit points where students fall away.

ONE WELL-ESTABLISHED MODEL OF ACCELERATED READING & WRITING

Chabot College

English 102:

Reading, Reasoning, and Writing (Accelerated)

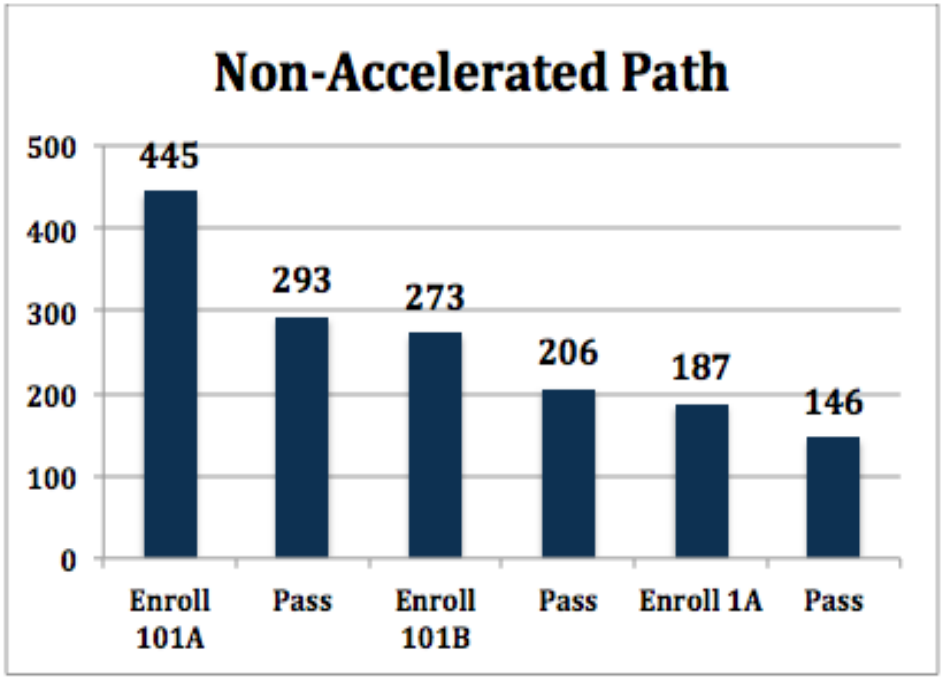
A one-semester 4-unit developmental English course leading directly to English 1A

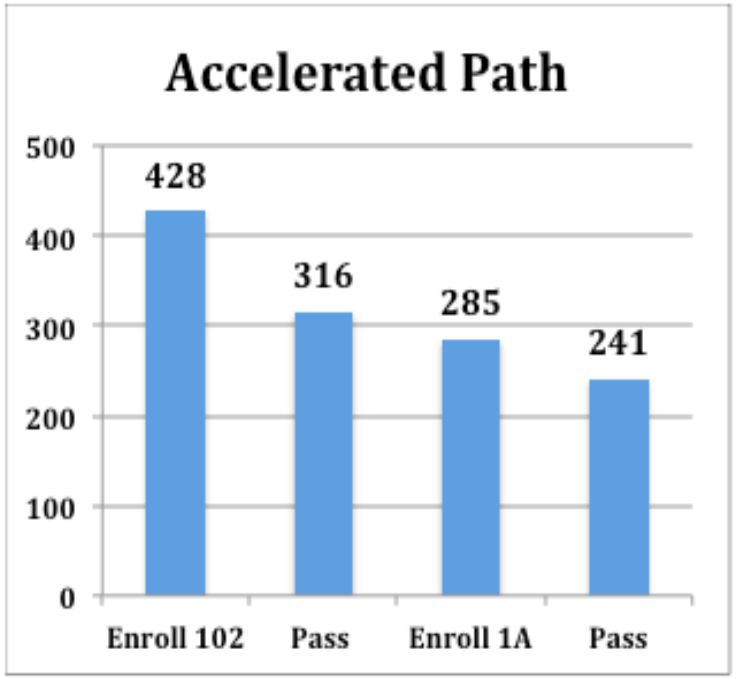
- An alternative to two-semester, 8-unit sequence
- No minimum placement score, students self-place in either the accelerated or two-semester path
- Developed with "backwards design" from college English: Students engage in the same kinds of reading, thinking, and writing of college English, with more scaffolding and support
- College has expanded accelerated offerings in last decade: in Fall '11, course constituted 75% of entry-level sections

EVIDENCE ACCELERATION WORKS:

Significant increase in students persisting to and passing college English

Fall 2006 Cohorts





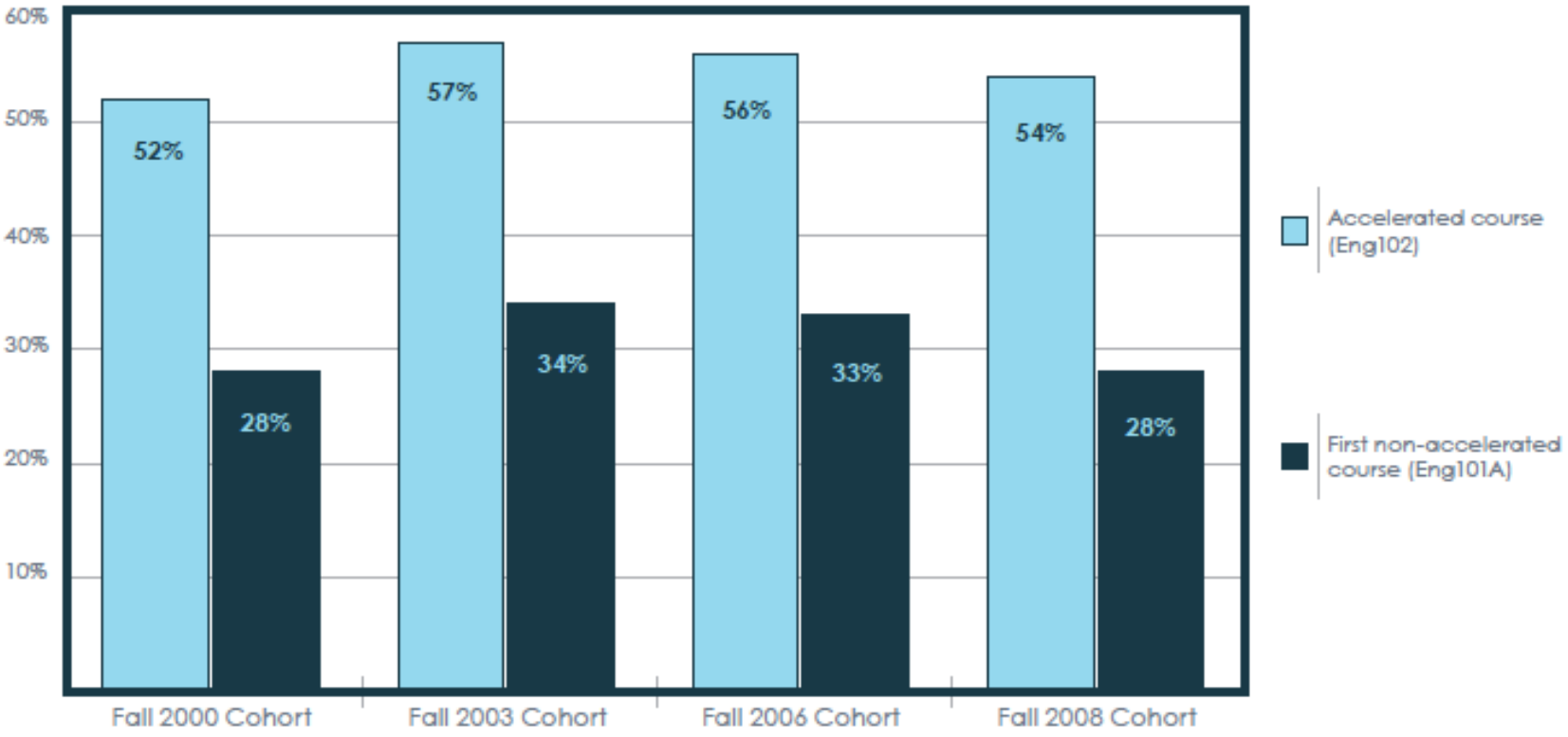
Students completing college English: 33%

Students completing college English: 56%

Data from the Basic Skills Progress Tracker, Data Mart, California Community Colleges Chancellor's Office. Students are followed for three years from their first enrollment in a basic skills English course (English 101A or 102) and tracked for all subsequent enrollments in English, including repeats.

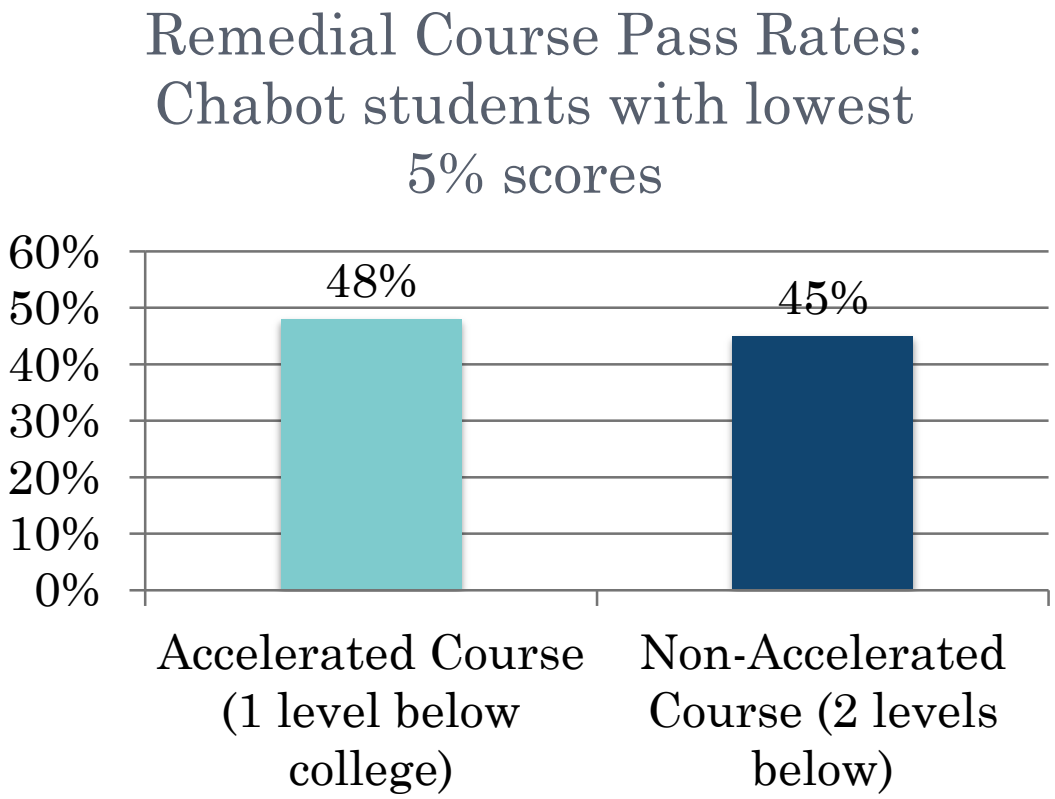
EVIDENCE ACCELERATION WORKS:

Differences in completion rates are consistent over ten years, as the majority of developmental students have been channeled into the accelerated path



N = 1,605 accelerated students; 1,996 non-accelerated students. [2]

Acceleration: Not Just for higher scoring students



Scores on both Accuplacer tests below 50 (reading, sentence skills)

N = 205 non-accelerated, 126 accelerated. Spring 06-Fall 09.

ONE NEW MODEL OF ACCELERATED DEVELOPMENTAL MATH:

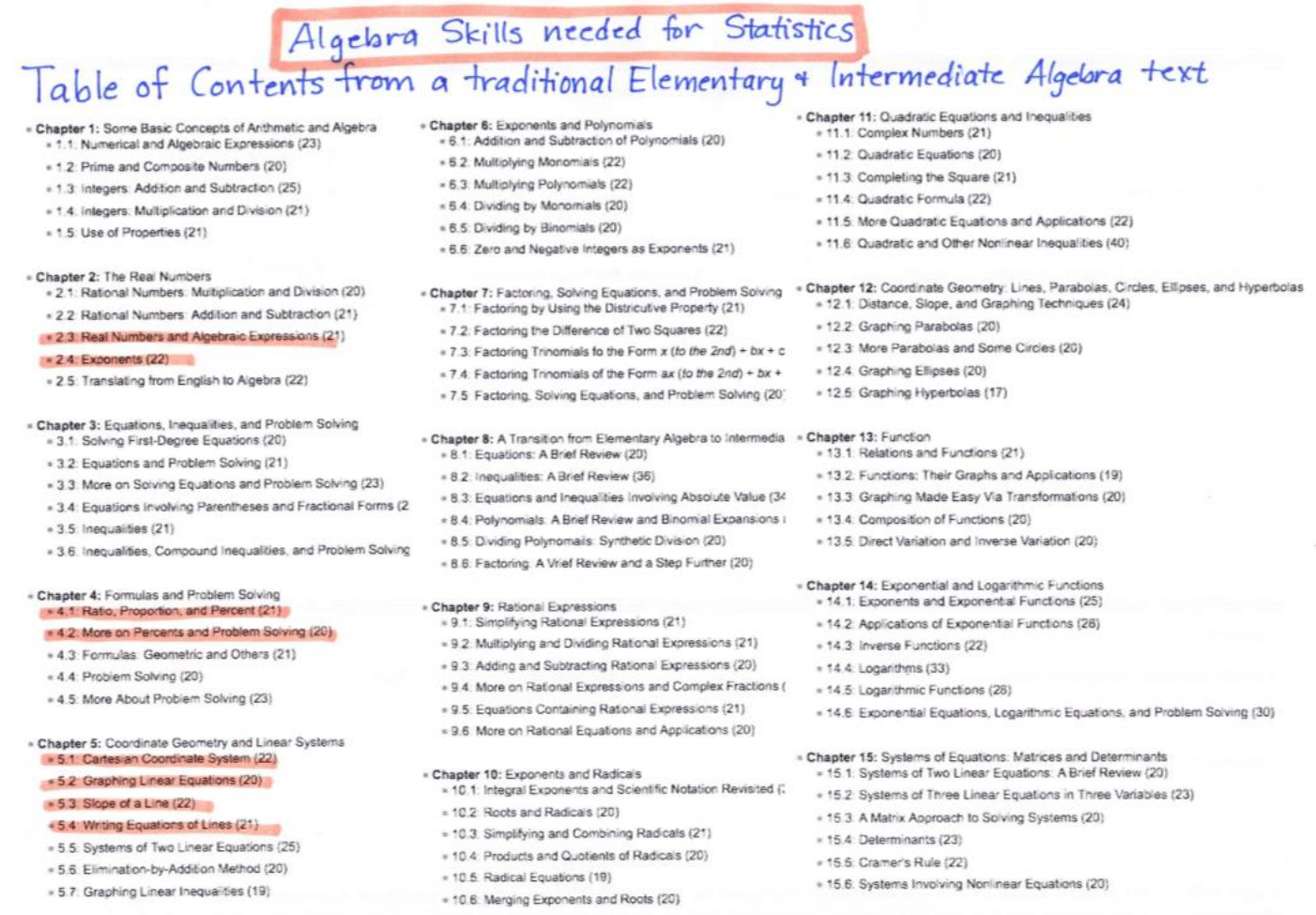
Path2Stats, Los Medanos College

A 6-unit developmental Math course with no prerequisite:

- Intended for non-STEM students
- Bypasses standard 4-course sequence leading to Pre-Calculus
- Developed through "backwards design" from college Statistics:
  - Includes those elements of algebra and arithmetic relevant to Statistics (plus a few others)
  - "Just-in-time remediation" of relevant algebra and arithmetic as students engage in statistical analysis
- Successful students eligible to take college Statistics
- Offered since 2009

RATIONALE FOR Path2Stats

- **Misalignment of Developmental Math with Statistics**



Algebra Skills needed for Statistics

Table of Contents from a traditional Elementary + Intermediate Algebra text

- **Chapter 1:** Some Basic Concepts of Arithmetic and Algebra
  - 1.1: Numerical and Algebraic Expressions (23)
  - 1.2: Prime and Composite Numbers (20)
  - 1.3: Integers: Addition and Subtraction (25)
  - 1.4: Integers: Multiplication and Division (21)
  - 1.5: Use of Properties (21)
- **Chapter 2:** The Real Numbers
  - 2.1: Rational Numbers: Multiplication and Division (20)
  - 2.2: Rational Numbers: Addition and Subtraction (21)
  - 2.3: Real Numbers and Algebraic Expressions (21)
  - 2.4: Exponents (22)
  - 2.5: Translating from English to Algebra (22)
- **Chapter 3:** Equations, Inequalities, and Problem Solving
  - 3.1: Solving First-Degree Equations (20)
  - 3.2: Equations and Problem Solving (21)
  - 3.3: More on Solving Equations and Problem Solving (23)
  - 3.4: Equations Involving Parentheses and Fractional Forms (2
  - 3.5: Inequalities (21)
  - 3.6: Inequalities, Compound Inequalities, and Problem Solving
- **Chapter 4:** Formulas and Problem Solving
  - 4.1: Ratio, Proportion, and Percent (21)
  - 4.2: More on Percents and Problem Solving (20)
  - 4.3: Formulas: Geometric and Others (21)
  - 4.4: Problem Solving (20)
  - 4.5: More About Problem Solving (23)
- **Chapter 5:** Coordinate Geometry and Linear Systems
  - 5.1: Cartesian Coordinate System (22)
  - 5.2: Graphing Linear Equations (20)
  - 5.3: Slope of a Line (22)
  - 5.4: Writing Equations of Lines (21)
  - 5.5: Systems of Two Linear Equations (25)
  - 5.6: Elimination-by-Addition Method (20)
  - 5.7: Graphing Linear Inequalities (19)
- **Chapter 6:** Exponents and Polynomials
  - 6.1: Addition and Subtraction of Polynomials (20)
  - 6.2: Multiplying Monomials (22)
  - 6.3: Multiplying Polynomials (22)
  - 6.4: Dividing by Monomials (20)
  - 6.5: Dividing by Binomials (20)
  - 6.6: Zero and Negative Integers as Exponents (21)
- **Chapter 7:** Factoring, Solving Equations, and Problem Solving
  - 7.1: Factoring by Using the Distributive Property (21)
  - 7.2: Factoring the Difference of Two Squares (22)
  - 7.3: Factoring Trinomials to the Form $x^2 + bx + c$
  - 7.4: Factoring Trinomials of the Form $ax^2 + bx +$
  - 7.5: Factoring, Solving Equations, and Problem Solving (20
- **Chapter 8:** A Transition from Elementary Algebra to Intermedia
  - 8.1: Equations: A Brief Review (20)
  - 8.2: Inequalities: A Brief Review (36)
  - 8.3: Equations and Inequalities Involving Absolute Value (3
  - 8.4: Polynomials: A Brief Review and Binomial Expansions
  - 8.5: Dividing Polynomials: Synthetic Division (20)
  - 8.6: Factoring: A Brief Review and a Step Further (20)
- **Chapter 9:** Rational Expressions
  - 9.1: Simplifying Rational Expressions (21)
  - 9.2: Multiplying and Dividing Rational Expressions (21)
  - 9.3: Adding and Subtracting Rational Expressions (20)
  - 9.4: More on Rational Expressions and Complex Fractions (
  - 9.5: Equations Containing Rational Expressions (21)
  - 9.6: More on Rational Equations and Applications (20)
- **Chapter 10:** Exponents and Radicals
  - 10.1: Integral Exponents and Scientific Notation Revisited (
  - 10.2: Roots and Radicals (20)
  - 10.3: Simplifying and Combining Radicals (21)
  - 10.4: Products and Quotients of Radicals (20)
  - 10.5: Radical Equations (19)
  - 10.6: Merging Exponents and Roots (20)
- **Chapter 11:** Quadratic Equations and Inequalities
  - 11.1: Complex Numbers (21)
  - 11.2: Quadratic Equations (20)
  - 11.3: Completing the Square (21)
  - 11.4: Quadratic Formula (22)
  - 11.5: More Quadratic Equations and Applications (22)
  - 11.6: Quadratic and Other Nonlinear Inequalities (40)
- **Chapter 12:** Coordinate Geometry: Lines, Parabolas, Circles, Ellipses, and Hyperbolas
  - 12.1: Distance, Slope, and Graphing Techniques (24)
  - 12.2: Graphing Parabolas (20)
  - 12.3: More Parabolas and Some Circles (20)
  - 12.4: Graphing Ellipses (20)
  - 12.5: Graphing Hyperbolas (17)
- **Chapter 13:** Function
  - 13.1: Relations and Functions (21)
  - 13.2: Functions: Their Graphs and Applications (19)
  - 13.3: Graphing Made Easy Via Transformations (20)
  - 13.4: Composition of Functions (20)
  - 13.5: Direct Variation and Inverse Variation (20)
- **Chapter 14:** Exponential and Logarithmic Functions
  - 14.1: Exponents and Exponential Functions (25)
  - 14.2: Applications of Exponential Functions (26)
  - 14.3: Inverse Functions (22)
  - 14.4: Logarithms (33)
  - 14.5: Logarithmic Functions (26)
  - 14.6: Exponential Equations, Logarithmic Equations, and Problem Solving (30)
- **Chapter 15:** Systems of Equations: Matrices and Determinants
  - 15.1: Systems of Two Linear Equations: A Brief Review (20)
  - 15.2: Systems of Three Linear Equations in Three Variables (23)
  - 15.3: A Matrix Approach to Solving Systems (20)
  - 15.4: Determinants (23)
  - 15.5: Cramer's Rule (22)
  - 15.6: Systems Involving Nonlinear Equations (20)

(EMERGING) EVIDENCE ACCELERATION WORKS: Proof of Concept

Los Medanos College
Completion of Transferable Math Requirement

Student placement in traditional math sequence	Traditional Path % of students who successfully complete any college-level math course (in three years)	Path2Stats % of students from pre-stats course who successfully complete statistics (in one year)
Transfer-level		100% (3 of 3)
Intermediate Algebra	33% (215 of 651)	82% (18 of 22)
Elementary Algebra	17% (102 of 598)	78% (25 of 32)
Pre-algebra or Arithmetic	9% (45 of 507)	38% (21 of 55)
Unknown placement		57% (4 of 7)
Overall Completion Rate	21% (362 of 1756)	60% (71 of 119)

They pass Statistics, but did they LEARN Statistics?

Snapshots of student achievement:

- Path2Stats students pass Statistics at rates comparable to students from Intermediate Algebra (73% vs. 74%).
- In Statistics, first cohort outperformed Honors section on departmental final exam. In last departmental assessment of student performance in Statistics, 100% of Path2Stats students were rated proficient or better on 2 of 3 course learning outcomes, 82% on the 3rd LO.
- On items from national statistics exam, the first two cohorts of Path2Stats had an overall performance within 3% of national average.

FURTHER PROOF OF CONCEPT

Early Data from Colleges in the CAP Community of Practice, 2011-12

	Traditional Algebra Path **Student completion of any transferable math course (in 3 years)**	**Pre-Statistics Path** **Student completion of transferable statistics course (in 1 year)**
National Data	20%	N/A
Los Medanos College	21%	60% (71 of 119)
City College San Francisco	17-19%	37% (30 of 81)
Cuyamaca College	20%	81% (22 of 27)
College of the Canyons (PALS: Pre-stat and stats in one semester)	12-16%	78% (39 of 50)

Window into a Classroom

- Video footage from Myra Snell's pre-statistics course, Fall 2009
- Los Medanos students grapple with a problem from the national statistics exam, CAOS
- Video filmed and edited by Jose Reynoso, a student co-inquirer working with Snell through a grant from the Faculty Inquiry Network

  http://vimeo.com/9055488 (or go to Vimeo and search for "Statpath")

CALIFORNIA ACCELERATION PROJECT

Supporting California's 112 Community Colleges
To Redesign Developmental English and Math Curricula
And Increase Student Completion

An initiative of the California Community Colleges' Success Network (3CSN), with support from the Walter S. Johnson Foundation, LearningWorks, and "Scaling Innovation," a project of the Community College Research Center funded by the William and Flora Hewlett Foundation

http://cap.3csn.org/

For more information, contact Katie Hern
khern@chabotcollege.edu